

## WHAT IS CLAIMED IS:

1. A gas delivery metering tube for delivering a gas, comprising:  
an outer tube having an inlet end and a closed end, and one or more arrays of  
orifices formed in said outer tube and extending along the substantial length of said outer  
5 tube;  
an inner tube having open inlet and outlet ends, said inner tube being nested and  
axially aligned inside of said outer tube forming an effective annular space there between,  
and wherein said outlet end of said inner tube terminates prior to the closed end of said  
outer tube; and  
10 a gas flow divider positioned adjacent the inlet ends of the inner and outer tubes  
and having a first gas flow path coupled to said inner tube and a second gas flow path  
coupled to the annular space between the inner and outer tubes.
2. The gas delivery metering tube of claim 1 wherein the gas flow divider  
15 comprises a disk having a central orifice forming said first gas flow path and a plurality  
of small orifices forming said second gas flow path.
3. The gas delivery metering tube of claim 1 wherein the gas flow divider  
comprises a flange on the inlet end of said inner tube, said flange having a lip  
20 containing a plurality of small orifices forming said second gas flow path.
4. The gas delivery metering tube of claim 2 or 3 wherein the cross sectional  
area of the inside of said inner tube is approximately equal to the total cross sectional area  
of said plurality of small orifices in said flow divider.  
25
5. The gas delivery metering tube of claim 1 further comprising a single gas  
supply port coupled to the inlet end of said inner and outer tube for supplying gas to said  
metering tube.
- 30 6. The gas delivery metering tube of claim 5 wherein said gas supply port  
comprises a block having a pocket formed therein, said pocket being sealed with a cover  
to create a confined passage, and a gas supply connector coupled to said pocket for

receiving a gas and a hollow tube assembly coupled to said pocket and said inlet end of the inner and outer tubes for conveying the gas.

7. The gas metering tube of claim 1 wherein one or more standoff spacers are  
5 attached to said inner tube to axially align the inner tube inside said outer tube.

8. The gas delivery metering tube of claim 1 wherein said metering tube is used in a chemical vapor deposition system.

9. In combination, the gas delivery metering tube of claim 1 and at least one  
10 injector assembly having at least one port for receiving said gas delivery metering tube.

10. In combination, the gas delivery metering tube of claim 1 and at least one  
15 shield assembly having at least one plenum for receiving said gas delivery metering tube.

11. A gas delivery metering tube for delivering a gas, comprising:  
an outer tube having an inlet end and a closed end, and one or more arrays of  
orifices formed in said outer tube and extending along the substantial length of said outer  
tube;

20 an inner tube having open inlet and outlet ends, said inner tube being nested and  
axially aligned inside of said outer tube forming an effective annular space there between,  
and wherein said outlet end of said inner tube terminates prior to the closed end of said  
outer tube;

a gas flow divider positioned adjacent the inlet ends of the inner and outer tubes  
25 and having a first gas flow path coupled to said inner tube and a second gas flow path  
coupled to the annular space between the inner and outer tubes; and

a single gas supply port coupled to the inlet end of said inner and outer tube for  
supplying gas to said metering tube, wherein said gas flow divider conveys gas to  
opposite ends of said metering tube while said single gas supply port is connected to only  
30 one end.

12. The gas delivery metering tube of claim 11 wherein the gas flow divider comprises a disk having a central orifice forming said first gas flow path and a plurality of small orifices forming said second gas flow path.

5 13. The gas delivery metering tube of claim 11 wherein the gas flow divider comprises a flange on the inlet end of said inner tube, said flange having a lip containing a plurality of small orifices forming said second gas flow path.

10 14. The gas delivery metering tube of claim 11 wherein said gas supply port comprises a block having a pocket formed therein, said pocket being sealed with a cover to create a confined passage, and a gas supply connector coupled to said pocket for receiving a gas, and a hollow tube assembly coupled to said pocket and said inlet end of the inner and outer tubes for conveying the gas.

Pat. & Copyright © 2000